

# Key Stage 3 National Strategy: Mathematics study modules

## An introduction for mentors

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### AIMS OF THE STUDY MODULES

These ten *Mathematics study modules*, designed for an individual teacher or group of teachers, have been produced by the mathematics strand of the Key Stage 3 National Strategy. They are intended for teachers who would like to reinforce, confirm and extend their knowledge of the Key Stage 3 mathematics curriculum and to develop their teaching skills. They are suitable for all teachers of mathematics in Key Stage 3, including supply teachers, trainee teachers, overseas-trained teachers and those who would like to return to teaching.

The modules are based on the two-part course, *Planning and teaching mathematics*, that has been offered to practising teachers during the early years of the Strategy.

The aims of the modules are to:

- develop teachers' understanding of important aspects of the mathematics curriculum in Key Stage 3;
- strengthen teachers' planning and teaching of mathematics in Key Stage 3.

It would be of considerable benefit to teachers studying the modules to have a mentor with whom to discuss their progress and any difficulties that they have. The mentor may be the teacher's head of department or another experienced teacher, or perhaps an advanced skills teacher, an advisory teacher or consultant. This guidance and introduction to the modules is intended for those who may be taking on that mentoring role. Separate guidance is available for teachers who are intending to study the modules.

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### CHOOSING STUDY MODULES

There is no need for any teacher to study all the modules unless they want to. Each is designed as a self-contained unit of work. They should choose those that most interest them and that you and they feel will be most useful. It also helps if two or three teachers study the modules at the same time so that they can discuss what they are learning and compare notes as they go along.

Descriptions of the ten modules are as follows:

#### **Module 1 Approaches to calculation**

- Discusses the development of calculation strategies from Key Stage 2 to Key Stage 3 to build on pupils' knowledge, skills and understanding
- Considers teaching methods to support the development of calculation strategies, using subtraction as a focus

#### **Module 2 Using calculators**

- Discusses when it is and when it is not appropriate for pupils to use a calculator

- Considers the skills that pupils need to use a calculator effectively and efficiently
- Discusses the progression of calculator skills and the implications for teaching

### **Module 3 Thinking about algebra**

- Considers some stimulating activities for teaching an aspect of algebra, the simplification of algebraic expressions
- Discusses how the activities can also help to develop algebraic reasoning
- Considers how the activities might be incorporated in mathematics lessons

### **Module 4 Making links in algebra**

- Considers the development of work on sequences, functions and graphs in Key Stage 3
- Considers links across different aspects of algebra and links with other strands of the mathematics curriculum
- Discusses the use of challenging activities to develop pupils' algebraic reasoning and the use of algebra in solving problems

### **Module 5 Geometrical reasoning 1**

- Looks at approaches to developing pupils' visualisation and geometrical reasoning skills
- Considers progression towards geometric proof

### **Module 6 Geometrical reasoning 2**

- Considers the connections between loci and constructions
- Discusses activities and resources to develop pupils' visual and geometrical reasoning skills

### **Module 7 Ratio and proportion 1**

- Discusses ratio and proportion as a key mathematical idea, with applications across many aspects of Key Stage 3 mathematics and in other subjects
- Analyses a lesson on ratio and proportion

### **Module 8 Ratio and proportion 2**

- Considers methods for solving problems involving ratio and proportion
- Discusses how mathematical problems and methods can be simplified or made more challenging to meet the needs of different pupils
- Highlights links between ratio and proportion and enlargement and similarity

### **Module 9 Using and applying mathematics**

- Considers the nature of problem solving in Key Stage 3 and the implications for planning and teaching
- Discusses examples of using and applying mathematics from the *Framework for teaching mathematics: Years 7, 8 and 9*
- Considers types of questions that will engage pupils in problem solving and probe their understanding

## Module 10 Effective oral and mental work

- Considers the importance of oral and mental work in all parts of mathematics lessons
- Discusses how to develop a programme of oral and mental starters

In general, the modules may be studied in any order but if a teacher chooses to study Module 4, it would be best if Module 3 were studied first, since Modules 3 and 4 relate to the same theme. Similarly, Module 5 should be studied before Module 6, and Module 7 before Module 8.

### PLANNING AND SUPPORTING STUDY TIME

On average, each module will take about 90 minutes of study time. For Module 9, teachers will need to allow about 2.5 hours. You may need to stress that 'doing' the modules by reading through them won't be enough. There is much more for teachers to gain from the modules by discussing ideas with you, trying them out and evaluating them in the classroom, and incorporating successful aspects into their teaching plans. If they are intending to study more than one module, make sure that they leave space between them so that they can try out and refine ideas in class.

The most effective help you can provide is probably through a face-to-face meeting before and after each module. You will probably need to make yourself aware of the content of the selected modules. There is no need for you to mark or assess any of the tasks, but be prepared to ask questions and to uncover any difficulties. After each module, discuss with the teacher what was the impact on pupils, particularly their attitude and learning, when they tried new ideas in the classroom. Establish how it will affect their future planning. You may also be able to anticipate potential areas of difficulty in the next module and provide some preparatory help.

Before teachers begin their study, they should be familiar with:

- section 1, Guide to the Framework, of the *Framework for teaching mathematics: Years 7, 8 and 9*;
- the general layout of the yearly teaching programmes, section 3 of the Framework, and how they link to the examples in section 4, the supplement of examples.

In each module, time is allowed for teachers to reflect on their stage of development, to study sections of the *Framework for teaching mathematics: Years 7, 8 and 9*, and to think about and make a note of action points arising from their reflections. These action points are crucial. As the teacher builds up their personal file, suggest finding time periodically to review progress together, looking back at what have been the main learning points. The file should become a resource they can refer to when they are later planning, trying and refining their teaching approaches.

### RESOURCES NEEDED

Each module identifies the essential and desirable resources that teachers will require. You may have in school copies of the desirable resources that could be loaned. Alternatively, the desirable resources can often be downloaded as PDF files from the Internet. Most are available via the mathematics publications list on the Key Stage 3 website ([www.standards.dfes.gov.uk/keystage3](http://www.standards.dfes.gov.uk/keystage3)). Detailed web references, where available, are given in each module.

In all the modules, teachers will need to equip themselves with:

- a personal file for inserting resource sheets and making notes as they work through the activities in the modules;

- the *Framework for teaching mathematics: Years 7, 8 and 9* (DfES 0020/2001).

In some of the modules, they will need:

- a scientific calculator;
  - a pencil, ruler, compasses and plain paper;
  - a DVD player.
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## THE VIDEO

Six of the modules make use of video excerpts. These are available on a DVD called *Mathematics study modules* which can be borrowed from your LEA Key Stage 3 mathematics consultant. Alternatively, contact the Mathematics team at the Centre for School Standards, Reading (tel: 0118 902 1001) for details of how to order one.

The lesson extracts shown in the video illustrate how mathematics teaching is developing in the schools that were filmed. The extracts are not intended as examples of 'perfect' lessons but have been chosen so that teachers can reflect on them as part of their professional development. When they are watching the video, they will be asked to focus on particular aspects of teaching and learning. You may find it helpful to watch some of the clips together and discuss the issues raised.

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